[0070] What is claimed as new and desired to be protected by Letters Patent of the United States is:

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1. A color pixel cell for an imaging device, said color pixel cell comprising:

a first, second and third doped regions of a first conductivity type formed in a substrate, at least one of said first, second and third doped regions having a substantially different depth in said substrate from the others;

a first, second and third photosensitive regions formed in said respective first, second and third doped regions for receiving first, second and third photocharges corresponding to a particular color wavelength; and

a first, second and third floating diffusion regions of a second conductivity type formed in said respective first, second and third doped regions for receiving said respective photocharges transferred from said respective first, second and third photosensitive regions.

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2. The color pixel of claim 1 wherein at least two of said first, second, and third doped regions have a substantially different depth from each other.

3. The color pixel of claim 1 wherein all three of said first, second, and third doped regions have a substantially different depth from each other.

4. The color pixel cell of claim 1, wherein said first doped region, said first photosensitive region and said first floating diffusion region correspond to a red sensor cell of said imaging device.

5. The color pixel cell of claim 1 wherein at least one of said first, second, and third doped regions is a retrograde well.

6. The color pixel cell of claim 1 wherein at least two of said first, second, and third doped regions is a retrograde well.

7. The color pixel cell of claim 1 wherein said first, second, and third doped regions are for collecting charges for red, blue and green wavelengths respectively and said first and third doped regions are retrograde wells.

8. The color pixel cell of claim 7 wherein said second doped region is a non-retrograde well.

9. The color pixel cell of claim 7 wherein the doping concentration at the surface of said first doped region is within the range of about 5×10^{14} to 1×10^{18} atoms per cm3.

10. The color pixel cell of claim 9 wherein the doping concentration at the surface of said first doped region is within the range of about 1 x 10^{16} to about 1 x 10^{17} atoms per cm3.

11. The color pixel cell of claim 10 wherein the doping concentration at the surface of said first doped region is about 4 x 10^{16} atoms per cm3.

12. The color pixel cell of claim 7 wherein the doping concentration at the bottom of said first doped region is within a range of about 1 x 10^{16} to about 2 x 10^{18} atoms per cm3.

13. The color pixel cell of claim 12 wherein the doping concentration at the bottom of said first doped region is within the range of about 2 x 10^{16} to about 1 x 10^{18} atoms per cm3.

14. The color pixel cell of claim 13 wherein the doping concentration at the bottom of said first doped region is about 1 x 10^{17} atoms per cm3.

15. The color pixel cell of claim 7 wherein the doping concentration at the surface of the second doped region is within the range of about 5 x 10^{18} to about 1 x 10^{18} atoms per cm3.

16. The color pixel cell of claim 15 wherein the doping concentration at the surface of said second doped region is within the range of about 1×10^{16} to about 1×10^{17} atoms per cm3.

17. The color pixel cell of claim 16 wherein the doping concentration at the surface of said second doped region is about 4×10^{16} atoms per cm3.

18. The color pixel cell of claim 7 wherein the doping concentration at the surface of said third doped region is within the range of about 5×10^{14} to about 1×10^{18} atoms per cm3.

19. The color pixel cell of claim 18 wherein the doping concentration at the surface of said third doped region is within the range of about 1×10^{16} to about 1×10^{17} atoms per cm3.

20. The color pixel cell of claim 19 wherein the doping concentration at the surface of said third doped region is about 4×10^{16} atoms per cm3.

21. The color pixel cell of claim 20 wherein the doping concentration at the bottom of said third doped region is within a range of about 1×10^{16} to about 2×10^{18} atoms per cm3.

22. The color pixel cell of claim 21 wherein the doping concentration at the bottom of said third doped region is within the range of about 2×10^{16} to about 1×10^{18} atoms per cm3.

23. The color pixel cell of claim 22 wherein the doping concentration at the bottom of said third doped region is about 1×10^{17} atoms per cm3.

24. The color pixel cell of claim 1, wherein said second doped region, said second photosensitive region and said second floating diffusion region correspond to a blue sensor cell of said imaging device.

25. The color pixel cell of claim 1, wherein said third doped region, said third photosensitive region and said third floating diffusion region correspond to a green sensor cell of said imaging device.

26. The color pixel cell of claim 1, wherein said first conductivity type is p-type, and said second conductivity type is n-type.

27. The color pixel cell of claim 26, wherein said first doped region is for a red sensor cell and is a deep retrograde well of a first depth.

28. The color pixel cell of claim 27, wherein said second doped region is for a blue sensor cell and is a shallow well of a second depth.

29. The color pixel cell of claim 28, wherein said third doped region is for a green sensor cell and is a shallow retrograde well of a third depth.

30. The color pixel cell of claim 29, wherein said first depth is substantially greater than said second depth.

31. The color pixel cell of claim 30, wherein said first depth is substantially greater than said third depth.

32. The color pixel cell of claim 31, wherein said third depth is substantially greater than said second depth.

33. The color pixel cell of claim 1, wherein said first conductivity type is n-type, and said second conductivity type is p-type.

34. The color pixel cell of claim 1, wherein each of said respective first, second and third photosensitive regions further comprises a respective photosensor for controlling the collection of charges in said photosensitive region.

35. The color pixel cell of claim 34, wherein each of said photosensor is a photodiode sensor.

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36. The color pixel cell of claim 34, wherein each of said photosensor is a photogate sensor.

37. The color pixel cell of clam 34, wherein each of said photosensor is a photoconductor sensor.

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38. A color pixel cell for an imaging device, said color pixel cell comprising:

a red pixel cell, a blue pixel cell and a green pixel cell, each comprising a respective first, second and third multiple graded wells of a first conductivity type formed in a substrate, said first, second and third multiple graded wells having substantially different depths in said substrate;

a photosensor formed in each one of said first, second and third multiple graded wells for sensing respective red, blue and green color wavelengths;

a reset transistor having a gate stack formed in each one of said first, second and third multiple graded wells;

a floating diffusion region of a second conductivity type formed in each one of said first, second and third multiple graded wells between said photosensor and said reset transistor for receiving charges from said photosensor, said reset transistor operating to periodically reset a charge level of said floating diffusion region; and

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~~an output transistor~~ having a gate electrically connected to said floating diffusion region.

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39. The color pixel cell of claim 38, wherein said first multiple graded well is a deep retrograde well of a first depth.

40. The color pixel cell of claim 39, wherein said deep retrograde well is a deep retrograde p-well.

41. The color pixel cell of claim 39, wherein said second multiple graded well is a shallow well of a second depth.

42. The color pixel cell of claim 38, wherein said shallow well is a shallow p-well.

43. The color pixel cell of claim 38, wherein said third multiple graded well is a shallow retrograde well of a third depth.

44. The color pixel cell of claim 40, wherein said shallow retrograde well is a shallow retrograde p-well.

45. The color pixel cell of claim 40, wherein said first, second, and third multiple graded well are at respective first, second and third depths and said first depth is substantially greater than said second and third depths.

46. The color pixel cell of claim 45, wherein said third depth is substantially greater than said second depth.

47. The color pixel cell of claim 38, wherein said photosensor further comprises a doped region of a second conductivity type located in each one of said first, second and third multiple graded wells.

48. The color pixel cell of claim 47, wherein said photosensor is a photodiode sensor.

49. The color pixel cell of claim 47, wherein said photosensor is a photoconductor sensor.

50. The color pixel cell of claim 38, further comprising a transfer gate located between said photosensor and said floating diffusion region in each of said wells.

51. The color pixel cell of claim 47, wherein said photosensor is a photogate sensor.

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52. The color pixel cell of claim 38, wherein said first conductivity type is p-type, and said second conductivity type is n-type.

53. The color pixel cell of claim 38, wherein said first conductivity type is n-type, and said second conductivity type is p-type.

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54. A CMOS imager comprising:

a substrate having a first, second and third multiple graded wells of a first conductivity type, said first, second and third multiple graded wells having substantially different depths in said substrate, and wherein each of said first, second and third multiple graded wells has a respective photosensor formed therein for sensing respective red, blue and green color wavelengths;

an array of pixel sensor cells formed in said first, second and third multiple graded wells; and

a circuit electrically connected to receive and process output signals from said array.

55. The CMOS imager of claim 55, wherein said first multiple graded well is a deep retrograde well having a first depth.

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56. The CMOS imager of claim 55, wherein said deep retrograde well is a deep retrograde p-well.

57. The CMOS imager of claim 55, wherein said second multiple graded well is a shallow well having a second depth.

58. The CMOS imager of claim 54, wherein said shallow well is a shallow p-well.

59. The CMOS imager of claim 57, wherein said third multiple graded well is a shallow retrograde well having a third depth.

60. The CMOS imager of claim 59, wherein said shallow retrograde well is a shallow retrograde p-well.

61. The CMOS imager of claim 59, wherein said first depth is substantially greater than said second and third depths, and said third depth is substantially greater than said second depth.

62. The CMOS imager of claim 54, wherein each pixel sensor cell comprises a floating diffusion region of a second conductivity type located in each of said first, second and third multiple graded wells.

63. The CMOS imager of claim 62, wherein said first conductivity type is p-type, and said second conductivity type is n-type.

64. The CMOS imager of claim 62, wherein said first conductivity type is n-type, and said second conductivity type is p-type.

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65. The CMOS imager of claim 62, wherein each pixel sensor cell further comprises a transfer gate located between said photosensor and said floating diffusion region.

66. The CMOS imager of claim 55, wherein said photosensor is a photogate sensor.

67. The CMOS imager of claim 55, wherein said photosensor is a photodiode sensor.

68. The CMOS imager of claim 55, wherein said photosensor is a photoconductor sensor.

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69. An imager comprising:

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an array of color pixel cells formed in a substrate having at least one deep retrograde well of a first conductivity type, at least one shallow well of said first conductivity type, and at least one shallow retrograde well of said first conductivity type, wherein each pixel sensor cell has a photosensor for sensing a respective particular color wavelength, and wherein said deep retrograde well,

said shallow well and said shallow retrograde well have substantially different depths;

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a circuit formed in the substrate and electrically connected to the array for receiving and processing signals representing an image output by the array and for providing output data representing the image; and

a processor for receiving and processing data representing the image.

70. The imager of claim 69, wherein said array, said circuit, and said processor are formed on a single substrate.

71. The imager of claim 69, wherein said array and said circuit are formed on a first substrate, and said processor is formed on a second substrate.

72. The imager of claim 69, wherein said at least one deep retrograde well has a depth substantially greater than the depths of said at least one shallow well and said at least one shallow retrograde well.

73. The imager of claim 69, wherein each pixel sensor cell further comprises a floating diffusion region of a second conductivity type located in each one of said at least one deep retrograde well, at least one shallow well and at least one shallow retrograde well.

74. The imager of claim 73, wherein said first conductivity type is p-type, and said second conductivity type is n-type.

75. The imager of claim 73, wherein said first conductivity type is n-type, and said second conductivity type is p-type.

76. The imager of claim 73, wherein each pixel sensor cell further comprises a transfer gate located between said photosensor and said floating diffusion region.

77. The imager of claim 76, wherein said photosensor is a photogate sensor.

78. The imager of claim 76, wherein said photosensor is a photodiode sensor.

79. The imager of claim 76, wherein said photosensor is a photoconductor sensor.

80. A method of forming photosensors for an imaging device, said method comprising the steps of:

forming a first, second and third doped regions of a first conductivity type in a substrate, wherein said first, second and third doped regions are formed at substantially different depths in said substrate;

forming a first photosensor for sensing charges of red color wavelength at an upper surface of said first doped region;

forming a second photosensor for sensing charges of blue color wavelength at an upper surface of said second doped region; and

forming a third photosensor for sensing charges of green color wavelength at an upper surface of said third doped region.

81. The method of claim 80, wherein said step of forming said first doped region further comprises forming a deep retrograde well located at a first depth in said substrate.

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82. The method of claim 81, wherein said step of forming said second doped region further comprises forming a shallow well located at a second depth in said substrate.

83. The method of claim 82, wherein said step of forming said third doped region further comprises forming a shallow retrograde well located at a third depth in said substrate.

84. The method of claim 83, wherein said first depth is substantially greater than said second and third depth.

85. The method of claim 84, wherein said third depth is substantially greater than said second depth.

86. The method of claim 80, wherein said first, second and third doped regions are formed sequentially.

87. The method of claim 80, wherein said first, second and third doped regions are formed simultaneously.

88. The method of claim 80, wherein said first conductivity type is p-type.

89. The method of claim 80, wherein said first conductivity type is n-type.

90. A method of forming a color pixel cell for an imaging device, said method comprising the steps of:

forming at least three multiple graded wells of a first conductivity type in a substrate, said at least three multiple graded wells being formed at substantially different depths in said substrate;

forming a photosensitive region in each of said at least three multiple graded wells;

forming a photosensor on an upper surface of said photosensitive region for receiving charges of a particular color wavelength; and

forming a floating diffusion region of a second conductivity type in each one of said at least three multiple graded wells for receiving charges transferred from said photosensitive region in the same well.

91. The method of claim 90, wherein one of said at least three multiple graded wells is a deep retrograde well formed at a first depth in said substrate.

92. The method of claim 91, wherein one of said at least three multiple graded wells is a shallow well formed at a second depth in said substrate.

93. The method of claim 92, wherein one of said at least three multiple graded wells is a shallow retrograde well formed at a third depth in said substrate.

94. The method of claim 90, wherein said first conductivity type is p-type, and said second conductivity type is n-type.

95. The method of claim 90, wherein said at least three multiple graded wells are formed sequentially.

96. The method of claim 90, wherein said at least three multiple graded wells are formed simultaneously.

97. The method of claim 90, wherein said first conductivity type is n-type, and said second conductivity type is p-type.

98. The method of claim 90, wherein said photosensor is a photodiode sensor.

99. The method of claim 90, wherein said photosensor is a photoconductor sensor.

100. The method of claim 90, further comprising the step of forming a transfer gate on each of said at least three multiple graded wells, between said photosensor and said floating diffusion region.

101. The method of claim 100, wherein said photosensor is a photogate sensor.

102. The method of claim 90 further comprising the step of forming a reset transistor in each of said at least three multiple graded wells for periodically resetting a charge level of said floating diffusion region, said floating diffusion region being the source of said reset transistor.

103. A method of forming a pixel array for an imaging device, said method comprising the steps of:

forming at least two graded wells of a first conductivity type in a substrate, said at least two graded wells being formed at substantially different depths in said substrate; and

respectively forming at least two pixel sensor cells in said at least two graded wells, wherein each pixel sensor cell has a photosensitive region, a photosensor formed on said photosensitive region for sensing charges of a particular color wavelength, and a floating diffusion region of a second conductivity type.

104. The method of claim 103, wherein said step of forming said at least two graded wells further comprises forming a deep retrograde well at a first depth in said substrate.

105. The method of claim 104, wherein said step of forming said at least two graded wells further comprises forming a shallow well of a second depth in said substrate.

106. The method of claim 105, wherein said step of forming said at least two graded wells further comprises forming a shallow retrograde well of a third depth in said substrate.

107. The method of claim 106, wherein said first depth is substantially greater than said second and third depths.

108. The method of claim 107, wherein said third depth is substantially greater than said second depth.

109. The method of claim 103, wherein said first conductivity type is p-type, and said second conductivity type is n-type.

110. The method of claim 103, wherein said at least two graded wells are formed sequentially.

111. The method of claim 103, wherein said at least two graded wells are formed simultaneously.

~~112. The method of claim 103, wherein said first conductivity type is n-type, and said second conductivity type is p-type.~~

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113. A color pixel cell for an imaging device, said color pixel cell comprising:

at least two doped regions of a first conductivity type formed in a substrate, said at least two doped regions having substantially different depths in said substrate;

at least two photosensitive regions respectively formed in said at least two doped regions for respectively receiving photocharges corresponding to a particular color wavelength; and

at least two floating diffusion regions of a second conductivity type formed in said respective at least two doped regions for receiving said respective phtocharges transferred from said respective at least two photosensitive regions.

114. The color pixel cell of claim 113, wherein each of said at least two doped regions, of said at least two photosensitive regions and of said at least two floating diffusion regions correspond to a particular color sensor cell of said imaging device.

115. The color pixel cell of claim 113, wherein said first conductivity type is p-type, and said second conductivity type is n-type.

116. The color pixel cell of claim 113, wherein said first conductivity type is n-type, and said second conductivity type is p-type.

117. The color pixel cell of claim 113, wherein one of said at least two doped regions is a deep retrograde well.

118. The color pixel cell of claim 113, wherein one of said at least two doped regions is a shallow well.

119. The color pixel cell of claim 113, wherein one of said at least two doped regions is a shallow retrograde well.

120. The color pixel cell of claim 113, wherein each of said respective at least two photosensitive regions further comprises a respective photosensor for controlling the collection of charges in said photosensitive region.

121. The color pixel cell of claim 120, wherein each of said photosensor is a photodiode sensor.

122. The color pixel cell of claim 120, wherein each of said photosensor is a photogate sensor.

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~~123. The color pixel cell of clam 120, wherein each of said photosensor is a photoconductor sensor.~~

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